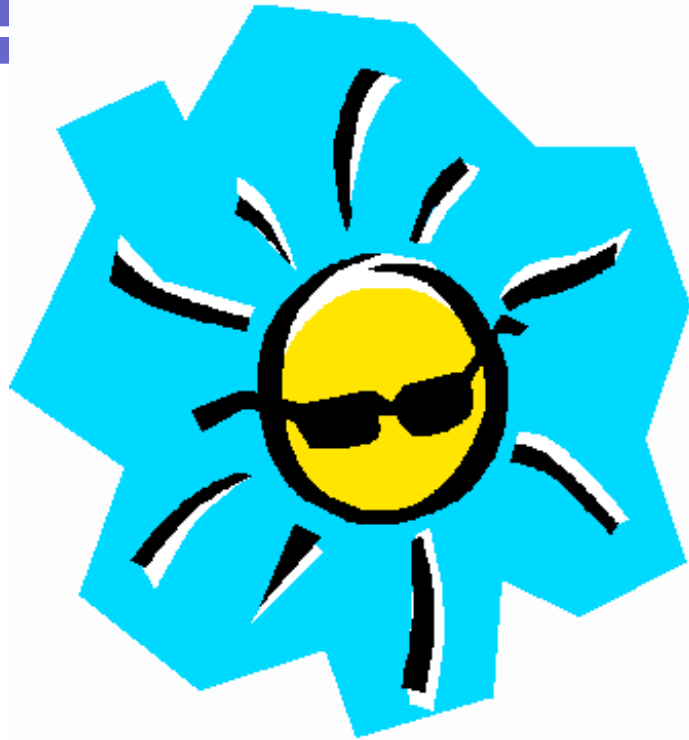


Vitamin D Deficient Rickets: A Disease of the Past?



Diane Dooley MD



History of Vitamin D Deficiency

1645 Whistler describes symptoms of rickets

1869 Trousseau: Rickets caused by lack of sun exposure and unhealthy diet. Cod-liver oil therapeutic

Welch 1900-almost all children younger than 2 years affected by rickets in urban areas

1930s – Use of cod liver oil becomes standard Rx for rickets.

166 Cases of rickets described in US in the medical literature 1986-2003

2008 – AAP recommends minimum daily intake of 400 IU daily Vitamin D

Vitamin D Deficient States

● Rickets

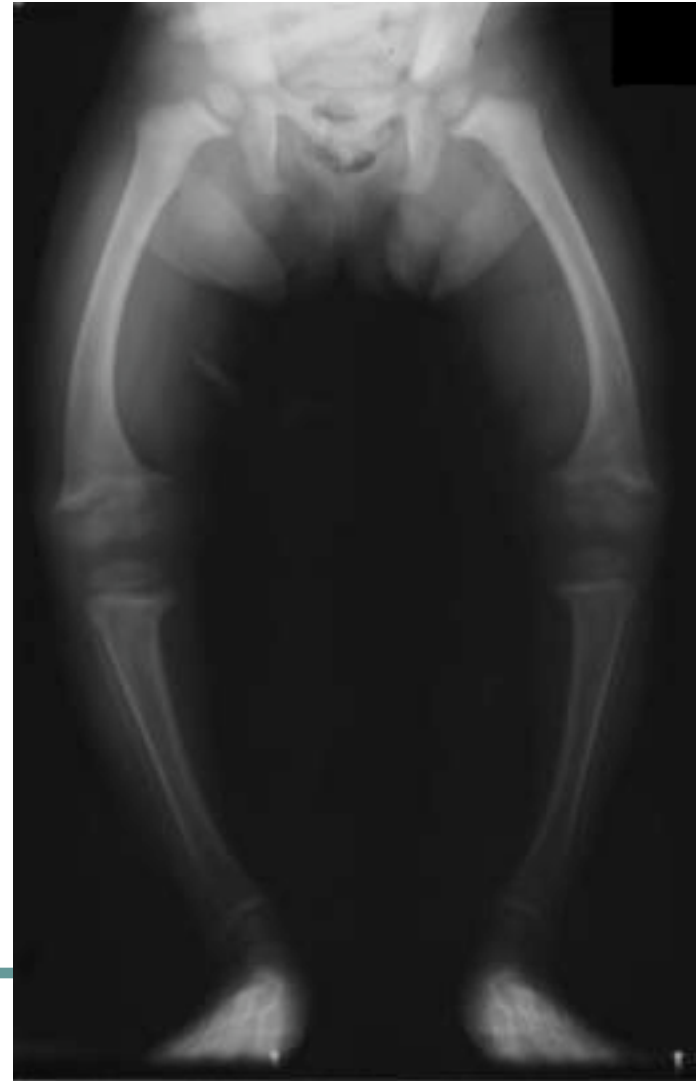
- Peak incidence 3-18 months
- Defective bone growth due to lack of mineralization at growth plate
- Hypocalcemic seizures
- Growth failure, lethargy, irritability
- Delay in gross motor development, bone pain



Vitamin D Deficient states

● Rickets

- Bowing or widening of physis
- Costochondral beading (rachitic rosary)
- Craniotables
- Delayed closure of anterior fontanel
- Dental abnormalities
- Flaring of ribs at diaphragm



Vitamin D Deficient States

- Adult Vitamin D deficiency implicated in
 - Increased infections
 - Autoimmune diseases (Multiple Sclerosis, Rheumatoid arthritis)
 - Cancer
 - Type 2 Diabetes
 - Bipolar disorder, schizophrenia
- Type I Diabetes in childhood
- Maternal Vitamin D status associated with adverse outcomes of pregnancy – miscarriage, preeclampsia, preterm birth



Laboratory diagnosis

Vitamin D status- 25(OH)-D levels

- Deficiency <37.5 nmol/mL
- Insufficiency 37.5-50 nmol/mL
- Sufficiency >50 (?) nmol/mL

Severe deficiency states associated with:



Ca, PO₄,



Alk Phos, PTH



Sources of Vitamin D- Food

Natural Food Sources:

Egg Yolk	20-25/yolk
Shrimp	152/100gm
Tuna	224-332/100gm
Canned salmon	624/100gm

Less
than
10%!

Fortified Food Sources:

Vitamin D milk	400/L
Formula	400/L
Cereal	40/serving
Yogurt	89/100gm



Sources of Vitamin D - Sun

UVB light converts
cholesterol in skin into
D3

Dark skinned people
require a longer duration
of sun exposure for
adequate production of
Vitamin D



Less UVB light is
available in the winter
months, higher latitudes,
and with cloud cover and
air pollution

Why do breast fed babies need supplemental Vitamin D?

Breast milk contains little vitamin D

- 25-78 IU/day
- Rates of vitamin D deficiency in breastfed infants up to 78% in winter

Limited sun exposure

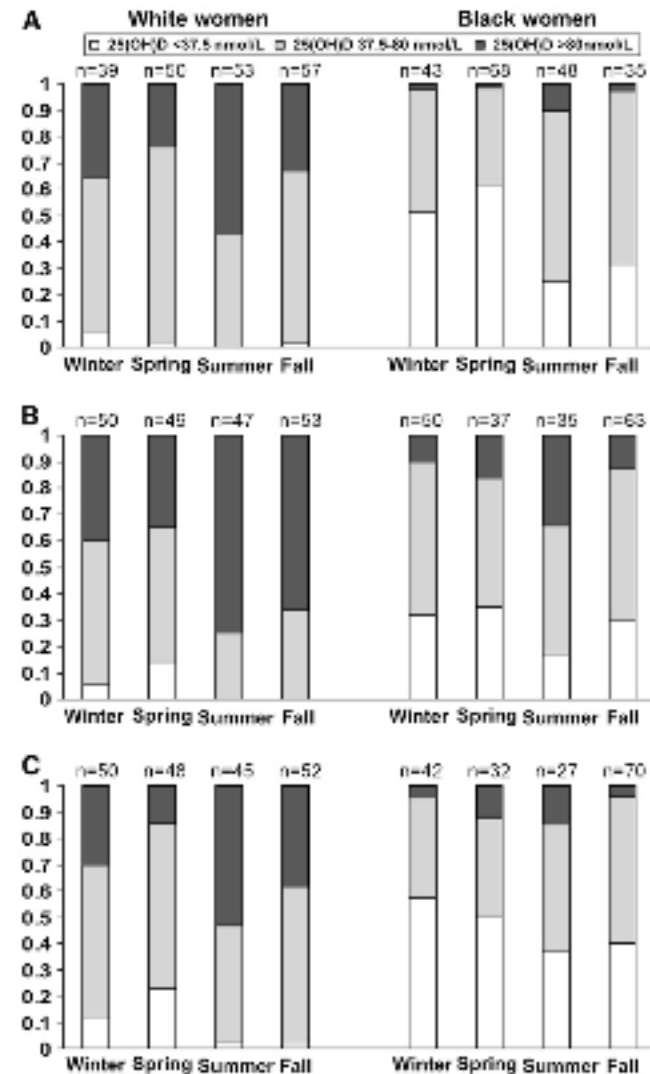
- AAP: infants less than 6 months should be kept out of direct sunlight



Why do breast fed babies need supplemental Vitamin D?

High rates of Vitamin D maternal deficiency

- Pittsburgh study at birth:
 - Black women
 - 29% deficient
 - 54% insufficient
 - White women
 - 5% deficient
 - 42% insufficient



Preventing Vitamin D deficiency

- Breastfed and partially breastfed infants should be supplemented with 400 IU/day of vitamin D beginning in the first few days of life.
- Supplementation should be continued unless the infants is weaned to at least 1L/day of vitamin D-fortified formula or fortified milk.

TriViSol contains 400 IU per ml



Unanswered questions

- Sun exposure recommendations
- Supplementation of children not breastfeeding
- Maternal supplementation recommendations
- Screening for Vitamin D deficiency
- Increasing consumption of Vitamin D fortified foods/drinks

